

BREEDING RANGE AND CONSERVATION OF FLAMMULATED OWLS (*OTUS FLAMMEOLUS*) IN NEVADA

SUSIE DUNHAM AND LARRY BUTCHER

Department of Biology/314, University of Nevada, Reno, NV 89557 U.S.A.

DAVID A. CHARLET

Ecology, Evolution, and Conservation Biology Program, University of Nevada, Reno, NV 89512 U.S.A.

J. MICHAEL REED¹

*Biological Resources Research Center and Department of Environmental and Resource Sciences, 1000 Valley Rd.,
University of Nevada, Reno, NV 89512 U.S.A.*

ABSTRACT.—The breeding distribution of flammulated owls (*Otus flammeolus*) in Nevada is poorly known and current range maps do not differentiate between sightings made during migration and the breeding season. We conducted owl surveys during the summers of 1992–95 and supplemented our data with published and unpublished breeding records to produce a breeding range map for flammulated owls in Nevada. In addition, we present a map of potential flammulated owl breeding localities, including mountain ranges with limber pine (*Pinus flexilis*), yellow pine (*Pinus* spp.), and fir (*Abies* spp.).

KEY WORDS: *Otus flammeolus*; owls; *Strigidae*; distribution; Nevada; montane; conifer.

Rango reproductivo y conservación de *Otus flammeolus* en Nevada

RESUMEN.—La distribución reproductiva de *Otus flammeolus* en Nevada, es pobremente conocida y mapas de rangos actuales no hacen diferencias entre avistamientos hechos durante la migración y la estación reproductiva. Realizamos una ruta de estudio de búho durante los veranos de 1992 a 1995 y suplementamos nuestros datos con registros reproductivos publicados y no publicados para producir un mapa de rango de distribución reproductiva para *O. flammeolus* en Nevada. En suma, presentamos un mapa de potenciales localidades reproductivas, incluyendo áreas montañosas con *Pinus flexilis*, *Pinus* spp. y *Abies* spp.

[Traducción de Ivan Lazo]

Flammulated owls (*Otus flammeolus*) are small, insectivorous, migratory raptors that have a western breeding distribution in North America extending from Guatemala north to southern British Columbia and east to the western edge of the Great Plains (A.O.U. 1983, McCallum 1994). They typically breed in mid-elevation montane habitat and are commonly associated with ponderosa pine (*Pinus ponderosa*) forests (Balda et al. 1975, Goggans 1985, Reynolds and Linkhart 1987, 1992, McCallum and Gehlbach 1988). In areas outside the Great Basin, the breeding range of flammulated owls is typically limited to mature stands of ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*P. jeffreyi*), or Washoe pine (*P. washoensis*) mixed with fir

(*Abies* spp. and *Pseudotsuga* spp.), quaking aspen (*Populus tremuloides*), and occasionally cottonwood (*Populus* sp.) (Marshall 1939, Johnson and Russell 1962, Phillips et al. 1964, Marcot and Hill 1980, Reynolds and Linkhart 1984, 1987, 1992, McCallum and Gehlbach 1988).

In Nevada, the pines listed above (referred to throughout as “yellow pine”) are poor indicators of flammulated owl habitat. With the exception of the eastern slope of the Sierra Nevada mountain range and adjacent large mountain ranges (e.g., Carson Range), large stands of yellow pine are limited to few mountain ranges in the extreme eastern and southern portion of the state. This lack of yellow pine does not appear to limit the breeding distribution of the flammulated owl and its flexibility in breeding requirements has been documented in other portions of its range (e.g., British Columbia,

¹ Present address: Department of Biology, Tufts University, Medford, MA 02155.

Howie and Ritcey 1987). In Nevada mountain ranges where yellow pines are absent, flammulated owls breed in the predominant montane conifer forests which are comprised of white fir (*Abies concolor*), subalpine fir (*A. lasiocarpa*), and limber pine (*P. flexilis*) (Fig. 1).

Flammulated owls are listed as sensitive in the USFS Intermountain Region (Finch 1992), but only one of the 16 forests in this region have considered this species in a forest management plan (Verner 1994). The basic biology and status of the species in Nevada is largely unknown because of the lack of regular survey efforts aimed at identifying new populations and monitoring the ones already known to exist. The only published distribution for the species in Nevada is based on anecdotal sightings and does not differentiate between breeding and migration records (Herron et al. 1985). These data have given an erroneous impression of the range because flammulated owls are highly mobile, and sightings during migration do not necessarily indicate breeding locations. Thus, compiling known breeding locations onto a range map will provide an important and necessary contribution to our understanding of this owl in Nevada.

The focus of this study was to define a biologically relevant distribution for flammulated owls in Nevada. Knowledge of the distribution of this species is important because the limited availability of yellow pine forests has resulted in different habitat use (as has been observed in other states: Webb 1982, Howie and Ritcey 1987) demonstrating a high degree of ecological flexibility in flammulated owls. This could prove important for managing Great Basin populations.

METHODS

Surveys were conducted between 15 May–15 July from 1992–95 (Table 1). To avoid misclassifying migrating or dispersing birds as breeding individuals, only owls located between these dates were considered breeding. These dates were chosen after considering the nesting phenology reported by Reynolds and Linkhart (1987). Owls in Nevada breed at elevations similar to those in Colorado (2200–3000 m), thus extrapolating likely dates for breeding phenology seemed appropriate. Owl records and sightings occurring before 15 May and after 15 July were not used because they could have been individuals still on migration or unsuccessful breeders and fledged young exploring before return migration.

Mountain ranges with the greatest extent of suitable habitat were selected for surveys. These areas included the Schell Creek, Jarbidge, Santa Rosa, White Pine, Spring, East Humboldt, Quinn Canyon, Snake Range,

and Ruby Mountain ranges. Surveys were carried out between dusk (~2030 H) and 0100 H on nights with weather conditions that facilitated hearing singing males (e.g., low winds and no precipitation). Common poorwills (*Phalaenoptilus nuttallii*) were abundant in all areas surveyed; whenever the audibility of their singing was reduced due to weather conditions we postponed surveys until conditions improved or until a later date. Surveys were carried out either from a car if a road passed directly through appropriate habitat or on foot from ridges within large stands of conifers. At the beginning of each survey, an attempt was made to locate nesting territories by listening for singing males leaving day roosts at sunset and following them until their characteristic food delivery call was heard at nests (R. Reynolds pers. comm.). When day-roosting males could not be located at sunset, responses were elicited by imitating their territorial song vocally and with prerecorded tapes. Singing males were then followed long enough (30 min to 3 hr) to determine approximate territory boundaries. Listening to multiple males responding to each other from a ridge-top vantage point also helped us determine territory boundaries. Due to the broad area surveyed, we were not able to locate nest cavities in all potential territories. Therefore, it was assumed that singing males present from 15 May–15 July were defending territories (not necessarily breeding) and the mountain range contained potential breeding pairs. To supplement our survey data, historical records that fit our "breeding owl" definition were compiled from published literature and from museum collection records. We also recorded information concerning the type of conifer forest used (Table 1)

RESULTS AND DISCUSSION

Our study increased the number of breeding flammulated owl records in Nevada from 23 to 47 (Table 1) and provided a significant expansion of the known breeding distribution for this species in the state (Herron et al. 1985). No previous breeding records existed for the Jarbidge, Schell Creek, Santa Rosa, and White Pine Mountains (Johnson and Russell 1962, Johnson 1965, 1973, 1975, Banks and Hansen 1970, Herron et al. 1985).

Survey areas where flammulated owls were not found are not reported because an insufficient amount of time was spent to determine if they were truly absent. Nevertheless, our survey methods resulted in nesting density estimates in White Pine, Schell Creek, and Jarbidge Mountain ranges similar to those reported outside of Nevada (Reynolds and Linkhart 1987).

Our results indicate that mountain ranges supporting small patches of conifer forest <50 ha in size are suitable for flammulated owl nesting. Seligman Canyon in the White Pine Mountains was not surveyed until mid-June 1994. It contained a ~40 ha stand of white fir that contained an estimated four flammulated owl breeding territories.

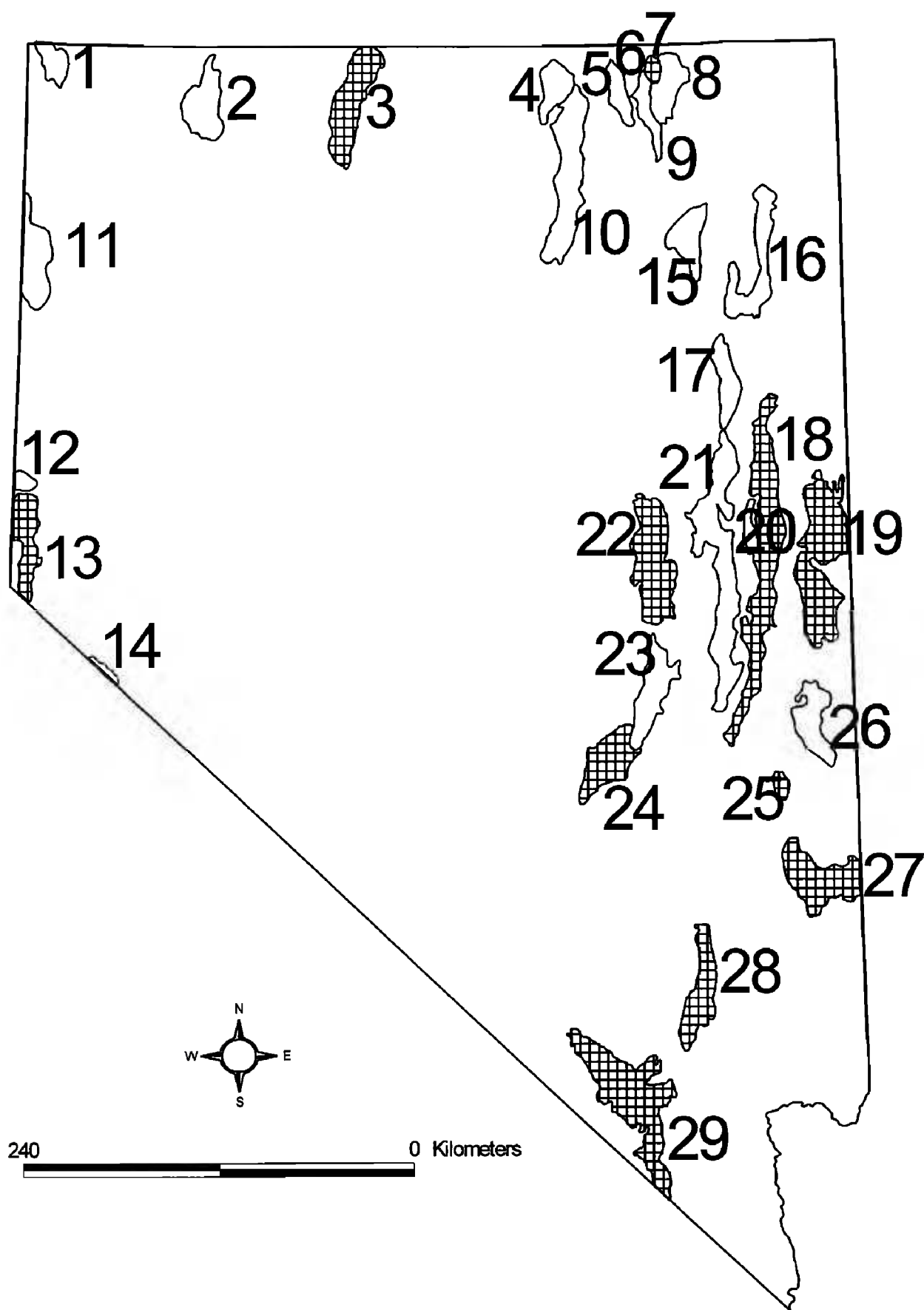


Figure 1. The known breeding distribution of flammulated owls (*Otus flammeolus*) in Nevada (dark ranges), and sites with >20 ha of potential habitat (mixed conifer forests including limber pine (*Pinus flexilis*), yellow pine (as defined in the text) (*Pinus* spp.), and white fir (*Abies concolor*) or subalpine fir (*Abies lasiocarpa*), limber pine only, and mixed aspen stands) (white ranges). Range names are: (1) Mosquito Mountains, (2) Pine Forest Range, (3) Santa Rosa Range (4) Bull Run Mountains, (5) Ichabod Range, (6) Copper Mountains, (7) Jarbidge Mountains, (8) Marys River Range, (9) Fox Creek Range, (10) Independence Mountains, (11) Madelin Mesa, (12) Peavine Mountain, (13) Carson Range, (14) Sweetwater Mountains, (15) East Humboldt Range, (16) Pequop Mountains, (17) Cherry Creek Range, (18) Schell Creek Range, (19) Snake Range, (20) Duck Creek Range, (21) Egan Range, (22) White Pine Range, (23) Grant Range, (24) Quinn Canyon Range, (25) Highland Range, (26) Wilson Creek Range, (27) Clover Mountains, (28) Sheep Range, and (29) Spring Mountains.

Table 1. Flammulated owl sightings and historical records from Nevada.

SURVEY DATES	MOUNTAIN RANGE	CANYON	NUMBER OF OWLS	DOMINANT MONTANE CONIFER ^a
1-4 July 1992	Santa Rosa	Lye Creek Campground	1 ^b	Aspen
10-12 July 1992	Jarbridge	Bear Creek Meadows	8 ^b	Subalpine fir, limber pine
8-14 June 1993	Spring	Lee Canyon	1 ^b	Ponderosa pine
25 June 1963	Spring	Macks Canyon	1 ^c	Ponderosa pine
16-19 June 1963	Spring	3 mi. N of Charleston Peak	4 ^c	Ponderosa pine
17 June 1961	Spring	Clark Canyon	1 ^d	Ponderosa pine
18-25 June 1993	Schell Creek	Sagehen Canyon	7 ^b	White fir, limber pine
18-20 June 1972	Quinn Canyon	Scofield Canyon	1-3 ^c	Ponderosa pine
29 June 1994	White Pine	Seligman Canyon	4 ^b	White fir
30 June 1994	White Pine	Hoppe Springs	1 ^b	White fir
6-8 June 1995	White Pine	Unnamed canyon NE of Mohawk Canyon	1 ^b	White fir
3-14 June 1963	Sheep	Hidden Forest Canyon	5 ^c	Ponderosa pine
26 June 1963	Clover	0.5 mi E of Ella Mountain	4 ^c	Ponderosa pine
20 June 1962	Snake Range	Lexington Creek	1 ^f	Ponderosa pine
5-10 June 1962	Snake Range	Snake Creek	4 ^f	Ponderosa pine
22 June 1972	Highland	Water Canyon	1 ^c	White fir
23 June 1972	Highland	Anderson Canyon	1 ^c	White fir
17-20 May 1992	Carson Range	Thomas Creek Canyon	1 ^b	Jeffrey pine

^a Scientific names in text.

^b This study.

^c Johnson (1965).

^d Banks and Hansen (1970).

^e Johnson (1973).

^f Johnson Museum of Vertebrate Zoology, UC Berkeley collection records.

Two of these were subsequently destroyed when nearly 75% of the fir stand was bulldozed to clear trees for construction of a large, open pit gold mine. The status of the remaining two territories adjacent to the mine pit was not known. Mohawk Canyon, Hoppe Springs, and two other unnamed canyons adjacent to Seligman Canyon were surveyed in June and July 1995 after the gold mine was constructed but only one additional singing male was found.

The frequency with which flammulated owls use small forest patches as breeding sites needs further study to adequately judge the effects of small scale habitat losses on the status of the breeding population of flammulated owls in the state. Annual survey routes should be established in all known breeding areas and in unsurveyed areas supporting patches of conifer trees. Surveys should determine the number of calling males in mountain ranges and their reproductive success to measure yr to yr population fluctuations. Multiple-yr (at least 4-5 yr in duration) studies similar to those of Reynolds

and Linkhart (1987), and McCallum and Gehlbach (1988), that have focused on the nesting biology of flammulated owls, also need to be initiated to document feeding habits and habitat use of these owls when they occupy patchy habitats such as those found in the mountain ranges of Nevada. Studies of this type will provide information on the minimum patch size required by breeding flammulated owls and the extent to which they use pure stands of aspen trees in the Pine Forest Mountains, Independence Mountains, and Twin River system of the Toiyabe Mountains.

ACKNOWLEDGMENTS

We thank the Audubon Society Whitell Fund, U.S. Forest Service, Center for Conservation Biology at Stanford University, the Nevada Biodiversity Initiative, and a donation from the Wells Family Foundation for financial support of this research. We thank S. Anderson and J. Weylan of the Humboldt National Forest, R. Reynolds of the USFS Rocky Mountain Experiment Station and B. Linkhart for logistic support and advice. This manuscript benefited from reviews by J.A. Robinson, G. Hoelzer, B. Johnson, M. Rubega, G.D. Hayward, N.K. Johnson, J.R.

Duncan, D.A. McCallum, D. Holt, R. Cannings and I. Warkentin. We thank K. Bishop of the Biological Resources Research Center for producing the figures. This is Contribution No. 10 of the Nevada Biological Resources Research Center.

LITERATURE CITED

- A.O.U. CHECKLIST OF NORTH AMERICAN BIRDS. 1983. American Ornithologists' Union, Washington, DC U.S.A.
- BALDA, R.P., B.C. MCKNIGHT AND C.D. JOHNSON. 1975. Flammulated owl migration in the southwestern United States. *Wilson Bull.* 87:520-533.
- BANKS, R.C. AND C.G. HANSEN. 1970. Bird records from southern Nevada. *Condor* 72:109-110.
- FINCH, D.M. 1992. Threatened, endangered and vulnerable species of terrestrial vertebrates in the Rocky Mountain region. USFS Gen. Tech. Rep. RM-215. Rocky Mountain Exp. Station, Ft. Collins, CO U.S.A.
- GOGGANS, R. 1985. Habitat use by flammulated owls in northeastern Oregon. M.S. thesis. Oregon State Univ., Corvallis, OR U.S.A.
- HERRON, G.B., C.A. MORTIMORE AND M.S. RAWLINGS. 1985. Nevada raptors: their biology and management. Biological Bull. No. 8, Nevada Dept. of Wildlife, Reno, NV U.S.A.
- HOWIE, R.R. AND R. RITCEY. 1987. Distribution, habitat selection, and densities of flammulated owls in British Columbia. Pages 249-254 in R.W. Nero, R.J. Clark, R.J. Knapton and R.H. Hamre [EDS.], *Biology and conservation of northern forest owls*. USDA For. Serv. Gen. Tech. Rep. RM-142.
- JOHNSON, N.K. 1965. The breeding avifaunas of the sheep and spring ranges in southern Nevada. *Condor* 67:93-124.
- . 1973. The distribution of boreal avifaunas in southern Nevada. *Occas. Pap. Biol. Soc. Nevada*, No. 36.
- . 1975. Controls of the number of bird species on montane islands in the Great Basin. *Evolution* 29:545-567.
- AND W.C. RUSSELL. 1962. Distributional data on certain owls in the western Great Basin. *Condor* 64:513-514.
- MARCOT, V.G. AND R. HILL. 1980. Flammulated owls in northwestern California. *Western Birds* 11:141-149.
- MARSHALL, J.T. 1939. Territorial behavior of the flammulated screech owl. *Condor* 61:71-78.
- MCCALLUM, D.A. 1994. Flammulated owl (*Otus flammeolus*). In A. Poole and F. Gill [EDS.], *Birds of North America*, No. 93. Academy of Natural Sciences of Philadelphia, American Ornithologists' Union, Washington, DC U.S.A.
- AND F.R. GEHLBACH. 1988. Nest-site preferences of flammulated owls in western New Mexico. *Condor* 90:653-661.
- PHILLIPS, A., J. MARSHALL AND G. MONSON. 1964. The birds of Arizona. Univ. Arizona Press, Tucson, AZ U.S.A.
- REYNOLDS, R.T. AND B.D. LINKHART. 1984. Methods and materials for capturing and monitoring flammulated owls. *Great Basin Nat.* 44:49-51.
- AND ———. 1987. The nesting biology of flammulated owls in Colorado. Pages 239-248 in R.W. Nero, R.J. Clark, R.J. Knapton and R.H. Hamre [EDS.], *Biology and conservation of northern forest owls*. USDA For. Serv. Gen. Tech. Rep. RM-142.
- AND ———. 1992. Flammulated owls in ponderosa pine: evidence of preference for old growth. Pages 166-169 in *Old growth forests in the southwest and Rocky Mountain regions, workshop proceedings*. USDA For. Serv. Gen. Tech. Rep. RM-213.
- VERNER, J. 1994. Current management situation: flammulated owls. Pages 10-13 in G.D. Hayward and J. Verner [EDS.], *Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment*. USDA For. Serv. Gen. Tech. Rep. RM-253.
- WEBB, B. 1982. Distribution and nesting requirements of montane forest owls in Colorado. Part III: Flammulated owl (*Otus flammeolus*). *Colo. Field Ornithol.* 16:76-81.

Received 20 January 1996; accepted 21 August 1996